CLAIMS

1. Process for designing an electronic system able to operate under irradiation, characterized in that it comprises the following stages:

I. Enumerating all the functions to be implemented by the system;

II. determining the electronic components able to physically implement these functions whilst giving preference to models having the larger scale integration;

III. determining the volume of components which can be protected by protection means referred to as shielding, whilst taking account of the radiation dose to be withstood by the system, the maximum permitted weight of the material chosen for said shielding, as well as the distance at which components selectively protected by said shielding could be from other, unshielded components;

IV. establishing a list of the most vulnerable components, whilst firstly taking account of their technology, then their degree of integration, whilst associating with each of these components the components which have to be installed in their immediate vicinity, if existing, and whilst firstly positioning the most vulnerable component, then that whose vulnerability is slightly less high and so on, optionally placing several identical vulnerability circuits;

V. selecting on the basis of the list of the preceding stage, a group of components, commencing with the most vulnerable components and limiting said group to components which, by their very dimensions, can be installed in the volume defined in stage III;

VI. examining whether the components in said system can implement coherent functions and only communicate with the remainder of the system by a reasonable number of wires, which transmit signals able to pass through without deterioration the distance stipulated in stage III between the selectively protected components and the other components; if all these conditions are

not simultaneously fulfilled, modifying by iteration the list of components in order to obtain this result, but without exceeding the volume defined in stage III; if all these conditions are simultaneously fulfilled pass to the following stage, the group of components obtained in this way being called the "first group of first components" and the other components being called the "second group of second components";

VII. designing the physical installation of the first group of first components, designing the shielding, constituted by at least one radiation-absorbing material, positioned around said first group of components, and designing between the first group of components and the second, connection means arranged so as not to form a penetration path for ambient radiation;

VIII. designing the physical installation of the second group of components, evaluating the radiation dose which they have to withstand and, if necessary, using a complimentary procedure for improving their suitability for operating under irradiation by a technique other than shielding;

IX. evaluating whether the solution to the set problem is in fact obtained; if it is not obtained, modifying the parameters of stage III and repeating the process as from stage III.

2. Process according to claim 1, comprising a subsequent stage:

X. validating the design by producing a prototype in accordance with the preceding design stages, at least with regards to the first group of components, installed and fitted in its protection means, and performing irradiation tests; if said tests are not in accordance with the specifications, the parameters of stage III are modified and the procedure is repeated as from stage III.

3. Electronic system able to operate under irradiation, characterized in that it comprises:

- a first group of components incorporating components which are intrinsically very vulnerable to such radiation, and possibly a few

associated elements which must be physically installed in their immediate vicinity, called the first group (21) of first components, protected against said radiation by protection means (22) known as shielding,

- a second group (20) of second components, which are less vulnerable than the first and not protected by shielding,
- connection means (23, 25) between said two assemblies arranged so as not to form a penetration path for ambient radiation.

4. System according to claim 3, wherein the shield (22) is constituted by two half-shells (50, 51) protecting said components (40, 41, 42, 43, 44, 45).

5. System according to claim 3, wherein the first group (21) of first components also incorporates at least one microcontroller (40) located within a shield (22).

6. System according to claim 3, wherein the first components located within a shield (22) are connected to an interface card (20) by a flexible printed circuit (23) along a baffle (52) provided at the input/output of the shield.

7. System according to claim 3, wherein the first group (21) of first components comprises a microcontroller (40) and an analog/digital converter (43) located within a shield (22) and connected to interfaces, across a baffle in the shield, via flexible integrated circuits carrying:

- supplies (63),
- a multiplexed bus (64) belonging to the microcontroller (40),
- control and data signals (65) belonging to the converter (43),
- the analog input signal (66) of the converter (43).

8. System according to claim 3, wherein the first group (21) of first components is mechanically connected to the remainder of the system by

a mechanical suspension (96, 97, 98).

9. System according to claim 8, wherein said mechanical suspension is ensured by elastomer cores (98).

10. System according to any one of the claims 3 to 9, wherein between the first group of first components and the shield is incorporated an electrically insulating, but thermally conductive product, in order to remove via the shield the heat generated by the operation of the electronic components.

11. Application of the process according to claim 1 to the electronic control of a mobile robot.